volatility of lead, [V_{Pb}''] can aid in the two photon absorption (TPA) process. The TPA originates from genuine two –photon absorption or two step (excited state) absorption [14]. The defects states lies in the forbidden gap of the material there by satisfying the conditions for TPA $\left(\frac{1}{2}E_g < \omega < E_g\right)$. Since [V_{Pb}''] can be systematically altered through A-site La^{3+} -doping, the study was extended to establish a correlation between [V_{Pb}''] and β, the nonlinear absorption coefficient. For this PZT system was selected because (i) it is well known that PZT is inherently p-type [15] and (ii) the low levels of lanthanum doping could vary the electrical properties of PZT. La^{3+} with 0, 0.001, 0.004, 0.008 and 0.01 was chosen for this study. The results were explained on the basis of defect chemistry and were further supported through leakage current and microstructure analysis.

In short, thesis describes the correlation of thin film texture on dielectric and piezoelectric characterizatics as well as that of defect chemistry on NLO characteristics.

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